What is claimed is:

1. A transmission synchronizer, comprising

a coupling sleeve;

a synchro hub;

a balk ring;

a clutch gear; and

a synchronizing support force generating mechanism;

wherein a relative rotation is generated between the synchro hub and the balk ring during a shift by a minute synchronizing torque generated between a balk ring cone surface and a clutch gear cone surface, the relative rotation inducing a circumferential force;

wherein the synchronizing support force generating mechanism is adapted to convert the circumferential force to an axially applied synchronizing support force, the axially applied synchronizing support force pressing the balk ring against the clutch gear and a relative rotation regulating structure, where the relative rotation regulating structure is located between the balk ring and the synchro hub;

wherein the synchronizing support force generating mechanism, while in neutral, is adapted to regulate the relative rotation between the balk ring and the synchro hub so that the synchronizing support force is not generated.

2. The transmission synchronizer of claim 1, wherein the synchronizing support force generating mechanism is installed in a position that faces the synchro hub and the balk ring along the axial direction and consists of a synchro hub concave portion and a balk ring convex portion that generates a synchronizing support force by coming into contact with a cam surface due to the indexed relative rotation between the synchro hub and the balk ring, and where the relative rotation regulating structure is installed in a position that faces the synchro hub and the balk ring along the axial direction and consists of a relative rotation positioning concave portion and a relative rotation positioning convex portion that regulate the amount of relative rotation between the synchro hub and the balk ring by means of the concave-convex contact.

3. The transmission synchronizer of claim 2, wherein a circumferential gap between the inclined surface of the synchro hub concave portion and the inclined surface of the balk ring convex portion is L1, and a circumferential gap between the relative rotation

positioning concave portion and the relative rotation positioning convex portion is L2, such that L1 is larger than L2.

4. The transmission synchronizer of claim 2, wherein the relative rotation positioning concave portion is adapted to engage with the relative rotation positioning convex portion when in neutral, and release engagement during the synchronizing operation.

5. The transmission synchronizer of claim 4, wherein an axial distance of the relative rotation positioning convex portion is L4, and an axial moving distance of the balk ring for synchronization is L3, such that L3 is larger than L4.

6. The transmission synchronizer of claim 2, wherein the relative rotation positioning concave portion are one or more rectangular grooves, and the relative rotation positioning convex portion are one or more rectangular projections.

7. The transmission synchronizer of claim 2, wherein the relative rotation positioning concave portion is a trapezoidal groove with a narrower circumferential length at the opening than the circumferential length at the bottom, and the relative rotation positioning convex portion is a trapezoidal projection with a wider circumferential length at the top than the circumferential length at the base.

8. The transmission synchronizer of claim 7, wherein the circumferential length of the relative rotation positioning concave portion at the opening is L5 and the circumferential length of the relative rotation positioning convex portion at the top is L6, such that L5 larger than L6.

9. The transmission synchronizer of claim 2, wherein the relative rotation positioning concave portions are rectangular grooves, and the relative rotation positioning convex portions are two rectangular projections.

10. A method of operating a transmission synchronizer, comprising
generating a relative rotation between a synchro hub and a balk ring during a shift by a minute synchronizing torque generated between a balk ring cone surface and a

cone surface of a clutch gear, the relative rotation inducing a circumferential force; and

converting the circumferential force to an axially applied synchronizing support force, the axially applied synchronizing support force pressing the balk ring against the clutch gear.

11. The method of claim 10, further comprising regulating the relative rotation between the balk ring and the synchro hub so that the synchronizing support force is not generated.

12. The method of claim 10, wherein converting the circumferential force to an axially applied synchronizing support force, the axially applied synchronizing support force pressing the balk ring against the clutch gear further comprises converting the circumferential force to an axially applied synchronizing support force, the axially applied synchronizing support force pressing the balk ring against the clutch gear and a relative rotation regulating structure, where the relative rotation regulating structure is located between the balk ring and the synchro hub.

13. The method of claim 12, wherein converting the circumferential force to an axially applied synchronizing support force, the axially applied synchronizing support force pressing the balk ring against the clutch gear and a relative rotation regulating structure, where the relative rotation regulating structure is located between the balk ring and the synchro hub further comprises generating a synchronizing support force by a synchronizing support force generating mechanism that is installed in a position that faces the synchro hub and the balk ring along the axial direction and consists of a synchro hub concave portion and a balk ring convex portion where the synchronizing support force is generated by the balk ring convex portion coming into contact with a cam surface due to the indexed relative rotation between the synchro hub and the balk ring, and where the relative rotation regulating structure is installed in a position that faces the synchro hub and the balk ring along the axial direction and consists of a relative rotation positioning concave portion and a relative rotation positioning convex portion that regulates the amount of relative rotation between the synchro hub and the balk ring by means of the concave-convex contact.

14. A transmission with a synchronizer, the synchronizer generating a synchronizing torque when changing speeds between an input shaft connected to an engine via a clutch and an output shaft, the transmission comprising:

a synchro hub that is affixed to a transmission rotation shaft;

a coupling sleeve that is connected to the synchro hub, the coupling sleeve being axially-movable toward the transmission rotation shaft to change between a neutral position and a shift change position;

a main gear that is rotatably disposed around the transmission rotation shaft, the main gear being engaged to rotate with the output shaft;

a clutch gear that is integrated with main gear, the clutch gear forming a gear cone surface; and

a balk ring that is positioned between the coupling sleeve and the clutch gear to be axially-movable, the balk ring being formed a balk ring cone surface which is taper-fitted into the gear cone surface;

wherein the synchro hub and the balk ring form a synchronizing support force generating mechanism between the synchro hub and the balk ring to convert a circumferential force to an axially applied synchronizing support force, and

wherein the synchro hub and the balk ring form a relative rotation regulating structure to regulate the relative rotation between the synchro hub and the balk ring, while in the neutral position.

15. The transmission of claim 14, wherein the balk ring is adapted to be pressed against the clutch gear with one of a motor actuator or a shift lever.

16. A transmission with a synchronizer, the synchronizer generating a synchronizing torque when changing speeds between an input shaft connected to an engine via a clutch and an output shaft, the transmission comprising:

a synchro hub that is affixed to the transmission rotation shaft;

a coupling sleeve that is connected to the synchro hub, the coupling sleeve being axially-movable toward the transmission rotation shaft to change between a neutral position and a shift change position;

a main gear that is rotatably disposed around the transmission rotation shaft, the main gear being engaged to rotate with the output shaft;

a clutch gear that is integrated with main gear, the clutch gear forming a gear cone surface; and

a balk ring that is positioned between the coupling sleeve and the clutch gear to be axially-movable, the balk ring being formed a balk ring cone surface which is taper-fitted into the gear cone surface;

means for converting a circumferential force to an axially applied synchronizing support force, and

means for regulating a relative rotation between the synchro hub and the balk ring, while in the neutral position.

17. The transmission of claim 16, wherein the circumferential force is induced by the relative rotation, where the relative rotation is generated between the synchro hub and the balk ring during a shift.

18. The transmission of claim 16, wherein the balk ring is adapted to be pressed against the clutch gear with one of a motor actuator or a shift lever.